APPENDIX B

M240B MACHINE GUN AND M249 SQUAD AUTOMATIC WEAPON EMPLOYMENT

The M240B machinegun and the M249 squad automatic weapon provide the heavy volume of close and continuous fire needed to accomplish the mission, and they can engage targets beyond the capability of individual weapons with controlled and accurate fire. The long-range, close defensive, and final protective fires delivered by the M240B machine gun form an integral part of a unit's direct fire plan. This appendix addresses the fundamental techniques of fire common to both the machine gun and the M249.

B-1. M240B MACHINE GUN

The M242 (25-mm cannon) and the M240C (coaxial machine gun) provide high-volume, accurate firepower from a stable and mobile platform. Rifle squads are generally focused on a dismounted enemy. While the BFVs are intended to provide the necessary direct fire support to the rifle squads, some situation may orient them in a different direction. The mounted element may not in the best position to provide this type of direct fire support to the dismounted element. When positioned to engage armored or mounted formations, their focus and primary targets often are different from that of the rifle squads. METT-TC will dictate separating the mounted section from the rifle squads making supporting direct fires difficult, if not almost impossible. It is under these circumstances that the platoon leader employs his M240B machine guns with the dismounted element, or with a rifle squad to provide long range, accurate, sustained fires under all visibility conditions against dismounted infantry, apertures in fortifications, buildings, and lightly armored vehicles and trucks. They also provide a high volume of short-range fire in self-defense against enemy aircraft. Machine gunners use point, traversing, searching, or searching and traversing fire to kill or suppress targets. The machine gun is the infantry platoon's primary weapon against a dismounted enemy (Table B-1, page B-2 provides specifications for the M240B). It provides a high volume of lethal, accurate fire to break up an enemy assault; it has limited effects against lightly armored vehicles; and it causes vehicle crews to button-up and operate with reduced effectiveness. Leaders position machine guns to—

- Concentrate fires where they want to kill the enemy.
- Fire across the platoon front.
- Cover obstacles by direct fire.
- Tie-in with adjacent units.

a. In the offense the platoon leader has the option, based on his analysis of the factors of METT-TC, to establish his base of fire element with one or two machine guns, the M249, or a combination of the two weapons. The platoon sergeant may position this element and control its fires when the platoon scheme of maneuver is to conduct the assault with the three dismounted squads. The machine gun, when placed on tripods, provides stability and accuracy at greater ranges than the bipod. The machine gunners target key enemy weapons until the assault element masks their fires. They can also suppress the enemy's ability to return accurate fire or to hamper the maneuver of the

assault element. They fix the enemy in position and isolate him by cutting off his avenues of reinforcement. They then shift their fires to the flank opposite the one being assaulted and continue to target any enemy automatic weapons that provide mutual support to his position, or engage any enemy counterattack. Their fires can also be used to cover the gap created between the forward element of the assaulting force and terrain covered by indirect fires when the indirect fires are lifted and shifted. On signal, the machine gunners and the base of fire element displace to join the assault element on the objective.

b. In the defense the machine gun provides sustained direct fires that cover the most likely or most dangerous dismounted avenues of approach and protect the unit against the enemy's dismounted close assault. The platoon leader positions his machine guns to concentrate fires in locations where he wants to do the most damage to the dismounted enemy and where they can take advantage of grazing enfilade fires, stand-off or maximum engagement range, and best observation of the target area. They provide overlapping and interlocking fires with adjacent units and cover tactical and protective obstacles with traversing or searching fires. When final protective fires are called for, machine guns (aided by M249 fires) place an effective barrier of fixed, direct fire across the platoon front.

B-2. M249 SQUAD AUTOMATIC WEAPON EMPLOYMENT

The M249 is primarily a squad leader's weapon to use in the close fight as a light automatic weapon. (Table B-1 provides specifications for the M249.) The M249 provides the rifle squads with a light automatic weapon to take with them into the assault. These weapons fire from the bipod, from the hip, or from the underarm position. They target any enemy supporting weapons being fired from fixed positions anywhere on the squad's objective. When the enemy's supporting weapons have been destroyed, or if there are none, the M249 gunners distribute their fire over that portion of the objective that corresponds to their team's position. The M249 in the hands of a rifleman can provide mobility and a high volume of fire up front in the assault, or across the squad's position in the defense. In the defense, they add the firepower of 10 or 20 riflemen without the addition of manpower. Characteristically, M249s are light, they fire rapidly, and have more ammunition than the rifles in the squad they support. Under certain circumstances the platoon leader may designate it as a machine gun and, with some adjustments, use it as a platoon weapon.

SPECIFICATIONS	M240B	M249
Size	7.62-mm gas operated machine gun	5.56-mm gas operated automatic
Weight	25.63 lb (11.1 kg)	15.07 lb (6.85 kg)
Length	1105 mm	1040 mm standard
Muzzle Velocity	853 m/s	965 m/s
Rate of Fire	Cyclic 650-850 rds/min	Cyclic 650-850 rds/min
Effective Ranges: Point	800 mm	600 m
Area	1100 m (Tripod)	800 m

Table B-1. Specifications for M240B and M249.

B-3. FUNDAMENTAL TECHNIQUES OF AUTOMATIC FIRE

The fundamental techniques of automatic fire are common to machine guns and squad automatic weapons. (For more detailed information refer to FMs 23-67 and 23-14.)

a. **Techniques of Fire**. Techniques of fire include direct lay, assault fire, overhead fire, and fire from a defilade position. Only automatic rifles use assault fire. Only machine guns can employ overhead fire.

(1) ***Direct Lay***. Gunners and automatic riflemen use the direct-lay technique by aligning the sights of the weapon on the target. This is the easiest and quickest means of delivering fire.

(2) ***Assault Fire.*** Automatic riflemen use assault fire when in close combat. Assault fire involves firing without the aid of sights, using the hip, shoulder, and underarm positions. The underarm position is best when rapid movement is required. In all three positions, automatic riflemen adjust their fire by observing the tracer and the impact of the bullets in the target area. Additional considerations for automatic riflemen using assault fire include—

- Maintaining alignment with the rest of the assault element.
- Reloading rapidly.
- Aiming low and adjusting the aim upward toward the target.
- Distributing fires across the objective when not engaging enemy automatic weapons.

(3) ***Overhead Fire.*** Gunners can use overhead fire when there is sufficient low ground between the machine gun and the target area for the maneuver of friendly forces. Normally, overhead fires are conducted with the machine guns on tripods, because they provide greater stability and accuracy, and the vertical mil angles can be measured by using the elevating mechanism. Gunners must accurately estimate range to the target and establish a safety limit that is an imaginary line, parallel to the target, where fire would cause casualties to friendly soldier. Gun crews and leaders must be aware of this safety limit. Leaders must designate signals for lifting or shifting fires. Gunners should not attempt overhead fires if the terrain is level or slopes uniformly, if the barrel is badly worn, or if visibility is poor.

(4) ***Fire from a Defilade Position.*** Defilade positions protect gunners from frontal or enfilading fires. Cover and concealment may not provide the gunner a view of some or all of the target area. In this instance, some other member of the platoon must observe the impact of the rounds and communicate adjustments to the gunner. Gunners and leaders must consider the complexity of laying on the target, the gunner's inability to make rapid adjustments to engage moving targets, the ease with which targets are masked, and the difficulty in achieving grazing fires for a final protective line.

b. **Characteristics of Fire.** To help the gunner understand the characteristics of fire for their weapons, the following definitions are helpful:

(1) ***Trajectory***. Trajectory is the path of the bullet in flight. For the M249, the path of the bullet is almost flat at ranges of 300 meters or less. At ranges beyond 300 meters, the trajectory curves as the range increases.

(2) ***Maximum Ordinate.*** This is the highest point the trajectory reaches between the muzzle of the weapon and the base of the target. It always occurs at a point about two-thirds of the distance from weapon to target and increases with range.

(3) ***Cone of Fire.*** This is the pattern formed by the different trajectories in each burst as they travel downrange. Vibration of the weapon, variations in ammunition, and atmospheric conditions all contribute to the trajectories that make up the cone of fire.

(4) ***Beaten Zone.*** This is the pattern formed by the rounds within the cone of fire striking the ground or the target. The size and shape of the beaten zone changes as a function of the range to and slope of the target. Gunners and automatic riflemen should engage targets to take maximum effect of the beaten zone. The simplest way to do this is to aim at the center base of the target. Most rounds will not fall over the target, and any that fall short will create ricochets into the target.

(5) ***Danger Space.*** This is the space between the weapon and the target where the trajectory does not rise above 1.8 meters (the average height of a standing soldier) and includes the beaten zone. Gunners should consider the danger space of their weapons when planning overhead fires.

c. **Classifications of Automatic Weapons Fire**. The US Army classifies automatic weapon fires with respect to the ground, the target, and the weapon.

(1) Fire with respect to the ground includes—

- *Grazing Fire*. Automatic weapons achieve grazing fire when the center of the cone of fire does not rise more than 1 meter above the ground. When firing over level or uniformly sloping terrain, the M249 can attain a maximum of 600 meters of grazing fire.
- *Plunging Fire*. Plunging fire occurs when weapons fire at long range, when firing from high ground to low ground, when firing into abruptly rising ground, or when firing across uneven terrain, resulting in a loss of grazing fire at any point along the trajectory.

(2) Fire with respect to the target includes—

- *Enfilade Fire.* Enfilade fire occurs when the long axis of the beaten zone coincides or nearly coincides with the long axis of the target. It can be frontal or flanking. It is the most desirable class of fire with respect to the target because it makes maximum use of the beaten zone.
- *Frontal Fire*. Frontal fire occurs when the long axis of the beaten zone is at a right angle to the front of the target.
- *Flanking Fire*. Flanking fire is delivered directly against the flank of a target.
- *Oblique Fire*. Gunners and automatic riflemen achieve oblique fire when the long axis of the beaten zone is at an angle other than a right angle to the front of the target.

(3) Fire with respect to the weapon includes—

- *Fixed Fire*. Fixed fire is delivered against a stationary point target when the depth and width of the beaten zone will cover the target.
- *Traversing Fire*. Traversing distributes fires in width by successive changes in direction.
- *Searching Fire*. Searching distributes fires in depth by successive changes in elevation.
- *Traversing and Searching Fire*. This class of fire is a combination in which successive changes in direction and elevation result in the distribution of fires both in width and depth.

d. **Types of Targets.** Targets have both width and depth. The size of the target, stated in terms of the number of aiming points required to engage it completely, determines its type.

(1) ***Point Target.*** Point targets require a single aiming point. Examples of this include bunkers, weapons emplacements, vehicles, and troops.

(2) ***Area Targets.*** Area targets require more than one aiming point. Machine gunners and automatic riflemen use traversing and searching (or a combination) to engage the target. Area targets are distinguished as linear, deep, and linear with depth. Gunners and automatic riflemen engage deep targets using searching fire. They engage linear targets using traversing fire. Finally, they engage linear with depth targets using traversing and searching fire.

e. **Rates of Fires** Automatic weapons fire in one of three rates: rapid, sustained, or cyclic. Normally machine gunners engage targets at the rapid rate to suppress the enemy quickly. Thereafter, they fire at a sustained rate to conserve ammunition. Automatic riflemen use the three-round burst, resighting their weapons as quickly as possible. In engaging aerial targets, machine gunners and automatic riflemen use the cyclic rate.

(1) ***Rapid Fire.*** Rapid fire is 200 rounds per minute in bursts of six to nine rounds at four- to five-second intervals.

(2) ***Sustained Rate.*** Sustained fire is 100 rounds per minute in bursts of six to nine rounds at four- to five-second intervals.

(3) ***Cyclic Rate.*** The normal cyclic rate of fire is 650 to 850 rounds per minute. To fire the cyclic rate, the gunner holds the trigger to the rear while the assistant gunner feeds ammunition into the weapon.

f. **Techniques for Automatic Weapons in the Defense.** Machine gunners and automatic riflemen use a number of techniques to ensure effective fires in defensive operations. Some techniques tie the characteristics of the weapons to the nature of the terrain. Others ensure distribution of fires across the squad or platoon front. Still others facilitate the concentration of fires against likely enemy avenues of approach or in engagement areas bounded by tactical obstacles. Finally, others aid in maintaining accurate fires during limited visibility. (For a detailed discussion refer to Appendix G.)

g. **Field-Expedient Methods**. The two most common field-expedient methods for laying the machine gun in the bipod mode on predetermined targets are the notched-stake or tree-crouch and the horizontal log or board technique.

(1) *Notched-Stake or Tree-Crotch Technique*. This technique is effective for all conditions of visibility. It involves sighting the weapon on each target and marking the position and elevation of the stock with a notched-stake or tree-crotch. The automatic rifleman then scoops out a shallow groove to provide for the movement of the bipod legs and to keep the front end of the weapon aligned.

(2) *Horizontal Log or Board Technique*. Automatic riflemen use this technique to mark sector limits and engage linear targets. It is best suited for flat, level terrain and involves placing a log or board horizontally so the weapon slides along it easily. The board may then be notched along its length to lay the weapon on a specific target reference point. It may also have limiting stakes placed to define the left and right limits of the weapon.

h. **Fire Control.** Leaders control the engagements of their automatic weapons through the use of control measures, coordinating instructions, and fire commands. (For a detailed discussion of direct fire control refer to Appendix G.)

(1) In the offense, coordinating instructions to machine gunners include instructions to initiate fires, a description of how the platoon leader sees the sequence of automatic weapon engagements and the location of other friendly soldiers in the area.

(2) In the defense, the leader describes the presence and subsequent action of friendly soldiers to the front of the platoon position (scouts, passing units), the initiation and sequence of weapon engagements, priority targets, and the planned or probable shifting of forces to displace or counterattack.

(3) The signal to initiate fires or FPLs or any occasions not covered by planning can be handled through fire commands. Fire commands must be clear and concise. Machine gunners and automatic riflemen repeat all fire commands. Fire commands contain the following elements:

- *Alert*. The leader must specify WHO is to engage.
- *Direction*. The leader must clearly indicate the general direction of the target. He may do so orally (giving a general orientation or designation of a reference point) by pointing, or by directing fires with tracer rounds from his own weapon. If he uses tracers, this becomes the last part of the command, and he directs, "Watch my tracer."
- *Description*. While visually following the target, the leader briefly describes the target, generally by the type of object: troops, vehicles, aircraft.
- *Range*. Leaders provide an estimate of the range to the target. Gunners and automatic riflemen use this estimate to set their rear sights, and to know how far to look to identify the target.
- *Method of Fire*. This element includes two parts: the manipulation (class of fire with respect to the weapon--fixed, traversing, searching, or traversing and searching) and the rate of fire. When the leader omits the rate of fire, the gunner assumes a rapid rate.
- *Command to Open Fire*. Timing the initiation of fires is important to gain surprise. Leaders may preface the command to commence firing with "At my command" or "At my signal." Gunners and automatic riflemen respond with "Ready" when they have identified the target and are ready to engage. Leaders then give the specified command or signal.

(4) Leaders adjust fires (direction, elevation, and rate), identify new targets, order cease-fires, or terminate the alert with subsequent fire commands.

(5) Squads and platoons establish SOPs governing the activities and automatic initiation, control, and cessation of fire for their automatic riflemen and gunners. These SOP items can include standard targets and how often to check with leaders once they have engaged the enemy.

i. **Dead Space Considerations.** Dead space defines an area where the waist of a soldier falls below a gunner's or automatic rifleman's point of aim. The most accurate method for determining dead space is to have one soldier walk the line of sight of the weapon (FPL or PDF) and make a pace count of those areas where he encounters dead space. Dead space can also be determined by observing the flight of tracer ammunition from a position behind and to the flank of the weapon.